

## CLAIMS

What is claimed is:

1. A method for vertical removal of excess solder from a circuit substrate, the  
5 method comprising the steps of:
  - providing a sacrificial circuit substrate with a plurality of pads, a portion of each pad having a solder-wettable material disposed thereon;
  - placing the plurality of pads of the sacrificial circuit substrate in vertical proximity to the excess solder of the circuit substrate;
  - 10 heating the excess solder to a liquidous state;
  - wicking the excess solder vertically onto the pads of the sacrificial circuit substrate; and
  - lifting the sacrificial circuit substrate from the proximity of the circuit substrate while the solder is in a liquidous state.

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2. The method of claim 1, wherein the circuit substrate is flexible and wherein the providing step includes providing a rigid sacrificial circuit substrate.

3. The method of claim 1, wherein the heating step includes using hot gas to  
5 reflow the excess solder.

4. The method of claim 1, wherein the providing step include providing solder-wettable vias connected to the pads, the vias including through-holes that are plated with a solder-wettable material.

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5. The method of claim 4, wherein the wicking step includes wicking of the solder into the through-holes of the vias.

6. The method of claim 4, wherein the dimensions of the pads, vias and through-holes are configured to leave a residual amount of solder on the circuit substrate after  
15 the wicking and lifting steps.

7. The method of claim 4, wherein the wicking step includes applying a vacuum to the vias to assist wicking of the solder into the vias.

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8. The method of claim 1, further comprising the step of applying flux to the sacrificial circuit substrate.

9. A method for vertical removal of excess solder from a ball-grid array portion of a circuit substrate having a solder mask disposed thereon, the method comprising the steps of:

- providing a rigid sacrificial circuit substrate with a plurality of vias arranged in an array pattern matching that of the ball-grid array portion of the circuit substrate, the vias having solder-wettable through-holes;
- 5 placing the plurality of vias of the sacrificial circuit substrate in vertical proximity to the excess solder of the ball-grid array portion of the circuit substrate;
- heating the excess solder to a liquidous state;
- 10 wicking the excess solder vertically into the vias of the sacrificial circuit substrate;
- and
- lifting the sacrificial circuit substrate from the proximity of the circuit substrate while the solder is in a liquidous state to prevent lateral movement across the solder mask.

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10. The method of claim 9, wherein the heating step includes using hot gas to reflow the excess solder.

11. The method of claim 9, wherein the providing step includes providing the vias 5 with solder-wettable pads connected to the solder-wettable material of the through-holes.

12. The method of claim 9, wherein the wicking step includes applying a vacuum to the vias to assist wicking of the solder into the vias and leaving a residual solder 10 amount on the ball-grid array portion of the circuit substrate sufficient to solder a ball-grid array package thereon.

13. The method of claim 12, wherein the providing step includes providing the vias with solder-wettable pads connected to the through-holes, and wherein the pads 15 and the through-holes are configured to leave a predetermined amount of solder on the circuit substrate after the wicking and lifting steps.

14. The method of claim 9, further comprising the step of applying flux to the sacrificial circuit substrate.

15. A system for the vertical removal of excess solder from a circuit substrate, the system comprising:

a heat source for heating the excess solder to a liquidous state; and  
a sacrificial circuit substrate with a plurality of vias, a portion of each via having a  
solder-wettable material disposed thereon, the vias configured to align with a  
plurality of excess solder bumps on the circuit substrate, the plurality of vias  
of the sacrificial circuit substrate to be located in vertical proximity to the  
excess solder of the circuit substrate so as to wick the excess solder vertically  
into the vias of the sacrificial circuit substrate.

16. The system of claim 15, wherein the circuit substrate is flexible and the  
sacrificial circuit substrate is rigid.

17. The system of claim 15, wherein the heat source is a hot gas source to reflow  
5 the excess solder.

18. The system of claim 15, wherein the vias of the sacrificial circuit substrate  
includes through-holes that are plated with a solder-wettable material and pads of  
solder-wettable material connected thereto.

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19. The system of claim 18, further comprising a vacuum source, wherein the  
vacuum source is applied to the vias through-holes opposite the excess solder liquid to  
assist wicking of the solder into the vias, the vacuum source and vias being  
configured to leave a residual amount of solder on the circuit substrate after the  
15 wicking of the excess solder into the vias.

20. The system of claim 15, further comprising flux applied to the sacrificial  
circuit substrate.